Project Code and Title

B.01.17 Upgrade Fuel System Integrity

Project Objective

The research proposed under this project will provide a technical foundation for an upgrade of existing FMVSS No. 301, Fuel System Integrity.

Background

Despite the implementation of FMVSS No. 301 in 1979, fires continue to be a serious safety threat. Many cases of fire are reported, especially with fatal crashes, and many serious injury accidents are fire related. The problem with fire related injuries and fatalities is the uncertainty of the impact related injuries versus the fire injuries, or the cause of death. Additionally, because of destroyed evidence and other factors, crash details are insufficient in many cases to determine the source of the fire, the exact accident configuration causing the fire, or the severity of the crash which resulted in fire. Even when all crash information is available, the CRASH algorithm is inaccurate in rear impacts, resulting in misleading accident statistics from the automated file.

Problem Definition

Fires occurr in approximately 2.4 percent of all fatal cases. NHTSA is currently attempting to estimate how many of these fires cause the death as opposed to impact related injuries. It is also estimated from NASS that 670 burn injuries occurr per year.

Research Approach

The proposed research will focus on analysis of detailed accident case studies. NASS hard copy cases were reviewed by experienced crash reconstructionists. Further analysis is being accomplished by detailed case studies of FARS accidents in which comprehensive data (photos, autopsy reports and detailed police reports) were available. From these cases the front-to rear impact is the only configuration which consistently causes burn related trauma due to fuel spillage. Therefore, a crash test has been developed which approximates the impact damage as seen in these real world front-to-rear impacts. This test development represents the first incremental approach in addressing the fire problem. This test is currently being used to assess the range of performance of a cross section of existing vehicles. A determination will be made of the feasibility of upgrading FMVSS 301 rear impact test procedure after results of the aforementioned FARS analysis and current NASS data have been reviewed. Further research will continue for areas of fire related research not yet fully

understood in terms of propagation and countermeasures. These include frontal fires (underhood), side impact related fires, rollover related fires and undercarriage related fires.

Potential Impact/Application

Upgrade of FMVSS No. 301 -- Fuel System Integrity.

Key Milestones

- Preliminary accident data analysis (completed)
- rear impact crash testing(completed)
- accident case study (near completion)
- analysis of underhood fires and effect on occupant survivability

RESOURCE REQUIREMENTS	FY 93	FY 94	FY 95	FY 96	FY 97
Contract Money ($K)	250	250	190	245	TBD

Project Manager(s)

Carl L. Ragland, (202) 366-4728 J.J. Liu

Completion Date

Fall ‘96 (phase I)

Publications

1. “Motor Vehicle Fires in Traffic Crashes and the Effects of the Fuel System Integrity Standard”, Glen G. Parsons, DOT HS 807 675
2. “An Analysis of Fires in Passenger Cars, Light Trucks, and Vans”, Joseph Tessmer, DOT HS 808 208
3. “Fuel System Integrity Upgrade
4. “Fuel System Integrity Upgrade - NASS & FARS Case Study," GESAC, Inc.

Keywords: Fuel system integrity - fire burn

Project Tasks

Task Title and Description

Task1. Problem Identification

- 1a: Preliminary Accident Statistics
- 1b: Detailed Case Study.
- 1c: Large File Analysis. (NCSA)
- 1d: NASS Data Collection and Special Study. (NCSA)
- 1e: Analysis of NASSS Data. (NCSA)
- 1f: Analysis of FARS Data (NRD, TSC)

Task2. Crash Testing and Data Analysis

- 2a: Preliminary Assessment of Baseline Vehicles subjected to Experimental FMVSS 301 Procedures Using Existing Test Devices.
- 2b: Analyze Existing Tests. (NRD)

Task 3. Literature Review

Task 4. Develop FMVSS 301 Test Procedure (NRD)

- 4a: Conduct Baseline Crash Tests (NRD)
- 4b: Evaluate FMVSS 301 Rear Crash Test Procedure (NRD)
- 4c: Develop FMVSS 301 Component Test Procedure (NRD)

Task 5. Develop FMVSS 301 Countermeasures

- 5a: Evaluate Crash Tests for Existing Countermeasures (NRD)
- 5b: Evaluate Component Countermeasures (NRD)

Task	Start Date	Projected Completion Date	Status/Responsibility
1a	1/93	3/93	complete
1b	9/93	3/94	complete
1c	11/93	11/94	complete
1d	1/94		indefinite
1e	6/96	8/96	
1f	9/95	9/96	
2a	3/93	5/93	complete
2b	3/93	6/93	complete
3a	3/93	3/94	complete
4a	8/95	12/95	complete
4b	1/96	5/96	complete
4c	6/95	*	* TBD
5a	5/95	5/96	complete
5b	5/96	*	* TBD

Supporting Contracts

Task	Contract Number	COTR (phone)	Contracting Officer (phone)	Total Contract Cost ($K)
1b	GESAC/ISSI	Gary Bell		50
1e	Calspan	S. Stern		
2a	Calspan	E. Swanson		
4a, b	TRC	E. Swanson		